Stoller
Grand Junction Office established 1959

299-E28-55 (A6806)
Log Data Report

Borehole Information:

Borehole: 299-E28-55 (A6806)			Site: 216-B-9 Crib		
Coordinates (WA St Plane)		GWL[1] (ft): n/a[2]		GWL Date: n/a	
North (m)	East (m)	Drill Date	TOC[3] Elevation (ft)	Total Depth (ft)	Type
136821	573849	07/48	685.93	150	cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel (welded)	2.3	8.625	8	0.322	0	150

Borehole Notes:

The drilling depth, casing depth, and date of drilling are derived from *Hanford Wells* (Chamness and Merz 1993). The casing size information for the 8-in. steel casing is confirmed from tape and caliper measurements collected in the field by Stoller personnel. The coordinates and TOC elevation are derived from HWIS[4].

Logging Equipment Information:

Logging System:	Gamma 2A		Type: SGLS (35%)
Calibration Date:	11/01	Calibration Reference:	GJO-2002-286-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C		Type: HRLS
Calibration Date:	11/01	Calibration Reference:	GJO-2002-309-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	
Date	03/12/02	03/13/02	03/14/02	03/18/02	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	2.5	38.5	150.5	55.0	
Finish Depth (ft)	43.5	63.0	98.0	106.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	n/a	n/a	n/a	n/a	
Pre-Verification	B0097CAB	B0100CAB	B0101CAB	B0102CAB	

Log Run	1	2	3	4	
Start File	B0099000	B0100000	B0101000	B0102000	
Finish File	B0099082	B0100049	B0101105	B0102102	
Post-Verification	B0099CAA	B0100CAA	B0101CAA	B0103CAA	

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2	3	4	
Date	05/03/02	05/03/02			
Logging Engineer	Kos	Kos			
Start Depth (ft)	11.0	18.0			
Finish Depth (ft)	16.0	32.0			
Count Time (sec)	300	300			
Live/Real	L	L			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
ft/min	n/a	n/a			
Pre-Verification	AC012CAB	AC012CAB			
Start File	AC012000	AC012011			
Finish File	AC012010	AC012039			
Post-Verification	AC012CAA	AC012CAA			

Logging Operation Notes:

Spectral gamma logging with the SGLS was performed in this borehole during March 2002 in four days; HRLS logging was performed in May 2002. Logging measurements are referenced to the top of the 8-in. casing. Repeat sections were collected in this borehole with the SGLS from 55-63 ft and from 98-106 ft to measure logging system performance.

Analysis Notes:

Analyst:	Henwood	Date:	07/29/02	Reference:	

The pre-run and post-run verification data met the acceptance criteria established for both the SGLS and HRLS. The verification data files utilized for the energy and resolution calibration necessary to process the SGLS data were the post-run for log runs 1 and 2 and the pre-run for log runs 3 and 4; post-run verification data were utilized for the HRLS.

A casing correction for 0.322-in.-thick casing was applied to the log data for the 8-in. steel casing.

Log spectra were processed in batch mode using APTEC Supervisor to identify individual energy peaks and determine count rates. Concentrations were calculated with Excel worksheet templates identified as G2ANOV01.xls and G1CFEB02.xls for the SGLS and HRLS, respectively, using efficiency functions and corrections for casing and dead time determined during calibrations. Where SGLS dead times exceeded about 40 percent, HRLS data were substituted.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs and processed uranium [^{238}U and ^{235}U]) detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, total gamma and dead time, and two repeat sections. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do

not include errors associated with the inverse efficiency function, dead time correction, or casing corrections.

Results and Interpretations:

^{137}Cs, ^{238}U, and ^{235}U (processed uranium) were the only man-made radionuclides detected in this borehole. Significant ^{137}Cs concentrations were measured between about 12 and 38 ft in depth. The maximum ^{137}Cs concentration was about 16,000 pCi/g at 21 ft.

Processed uranium is generally identified by the coexistence of the 1001-keV energy peak of metastable protactinium-234 (^{234m}Pa) that is used to assay the man-made ^{238}U concentration and the 186-keV energy peak of uranium-235 (^{235}U). Both energy peaks were identified to exist intermittently between 42 and 62 ft. Both ^{238}U and ^{235}U are detected near their respective MDLs of about 16 and 1 pCi/g.

Changes in the ^{40}K concentrations from near 12 pCi/g at 18 ft to about 18 pCi/g at 25 ft suggest a transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The repeat log data sections acquired from the 55- to 63-ft and 98- to 106-ft depth intervals show good repeatability of logging depth and concentration calculations.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

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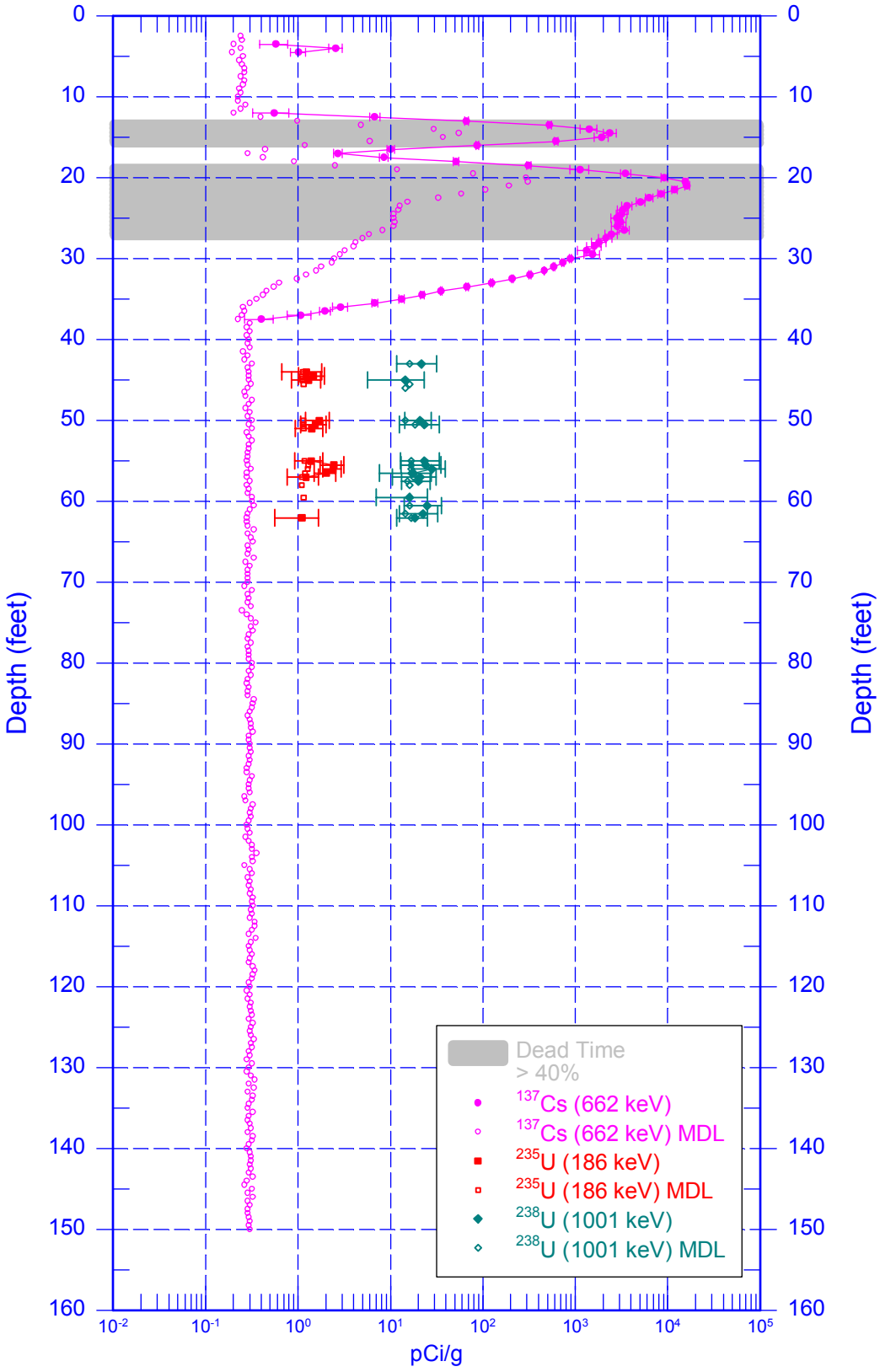
[1] GWL – groundwater level
[2] n/a – not applicable
[3] TOC – top of casing
[4] HWIS – Hanford Well Information System

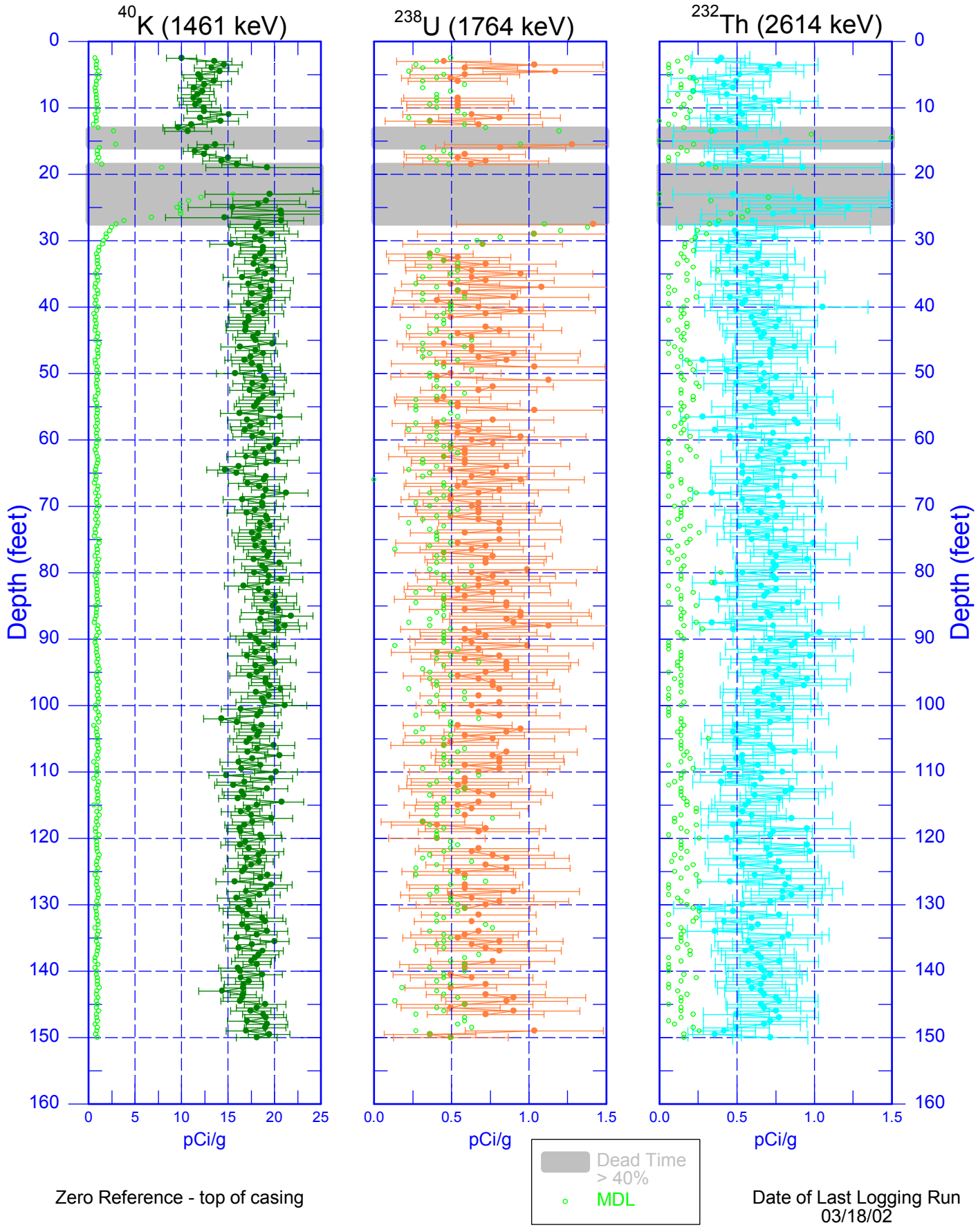
299-E28-55 (A6806)
Man-Made Radionuclides



Zero Reference - Top of Casing

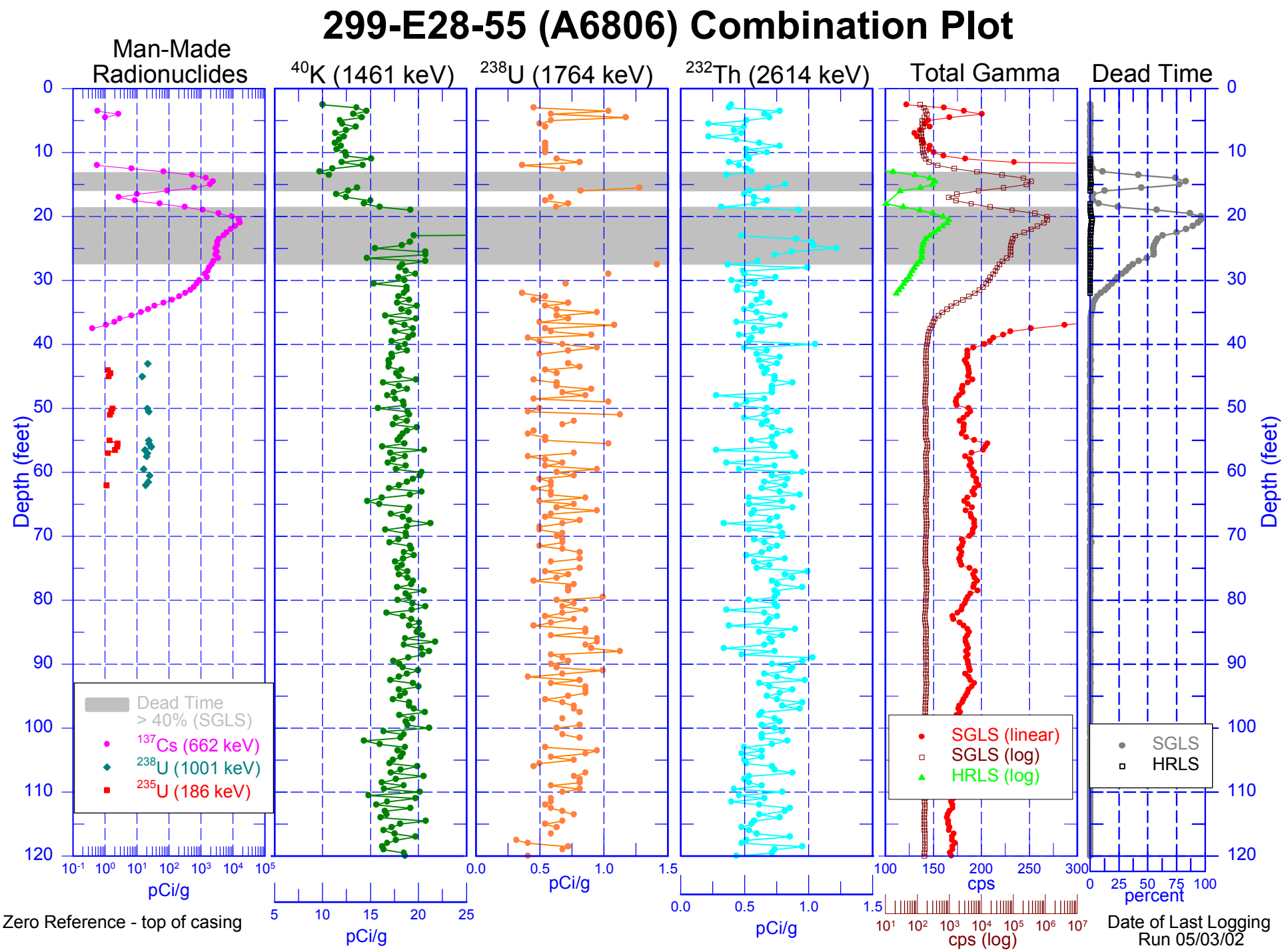
Date of Last Logging Run
05/03/02

299-E28-55 (A6806)
Natural Gamma Logs

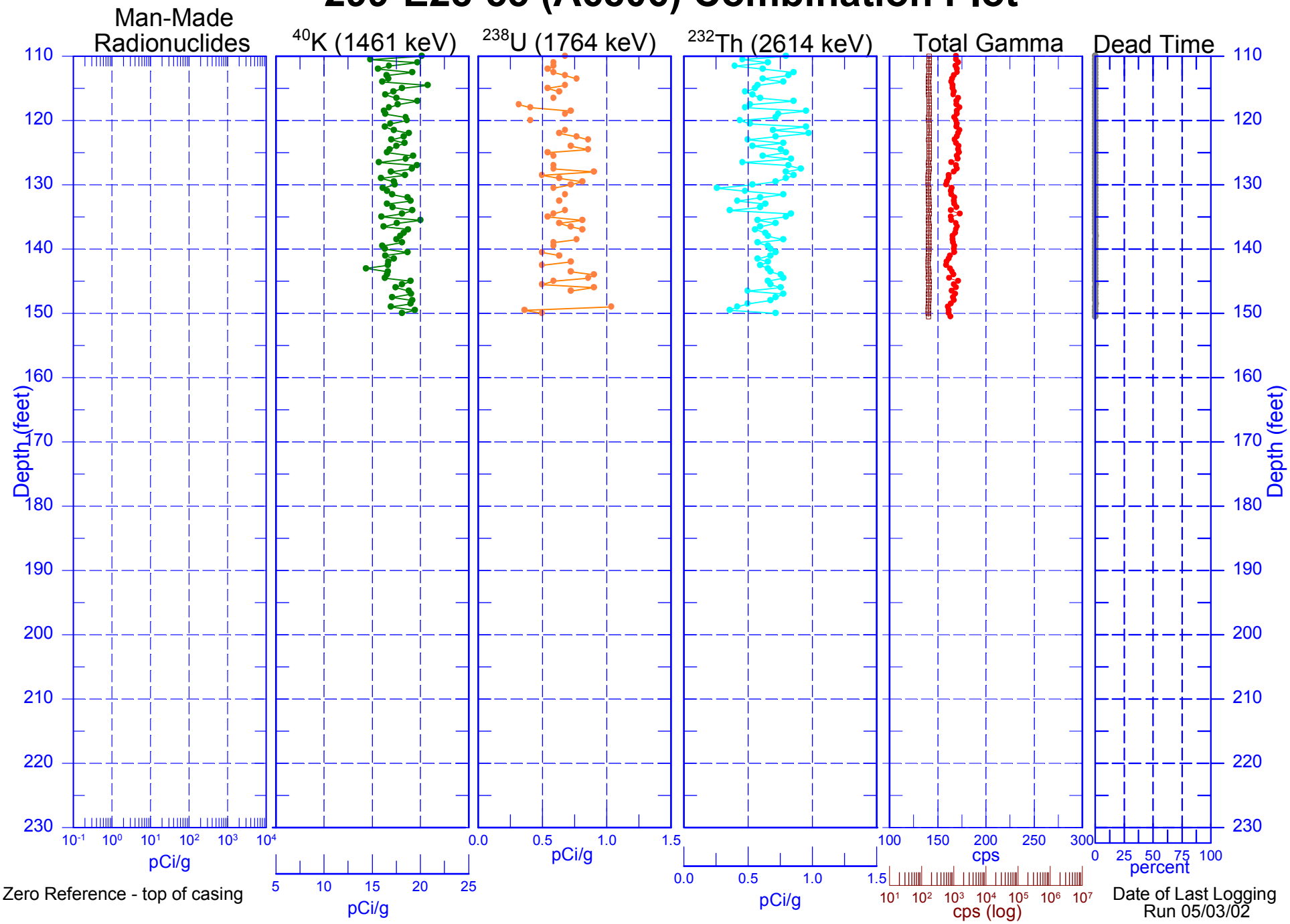


Zero Reference - top of casing

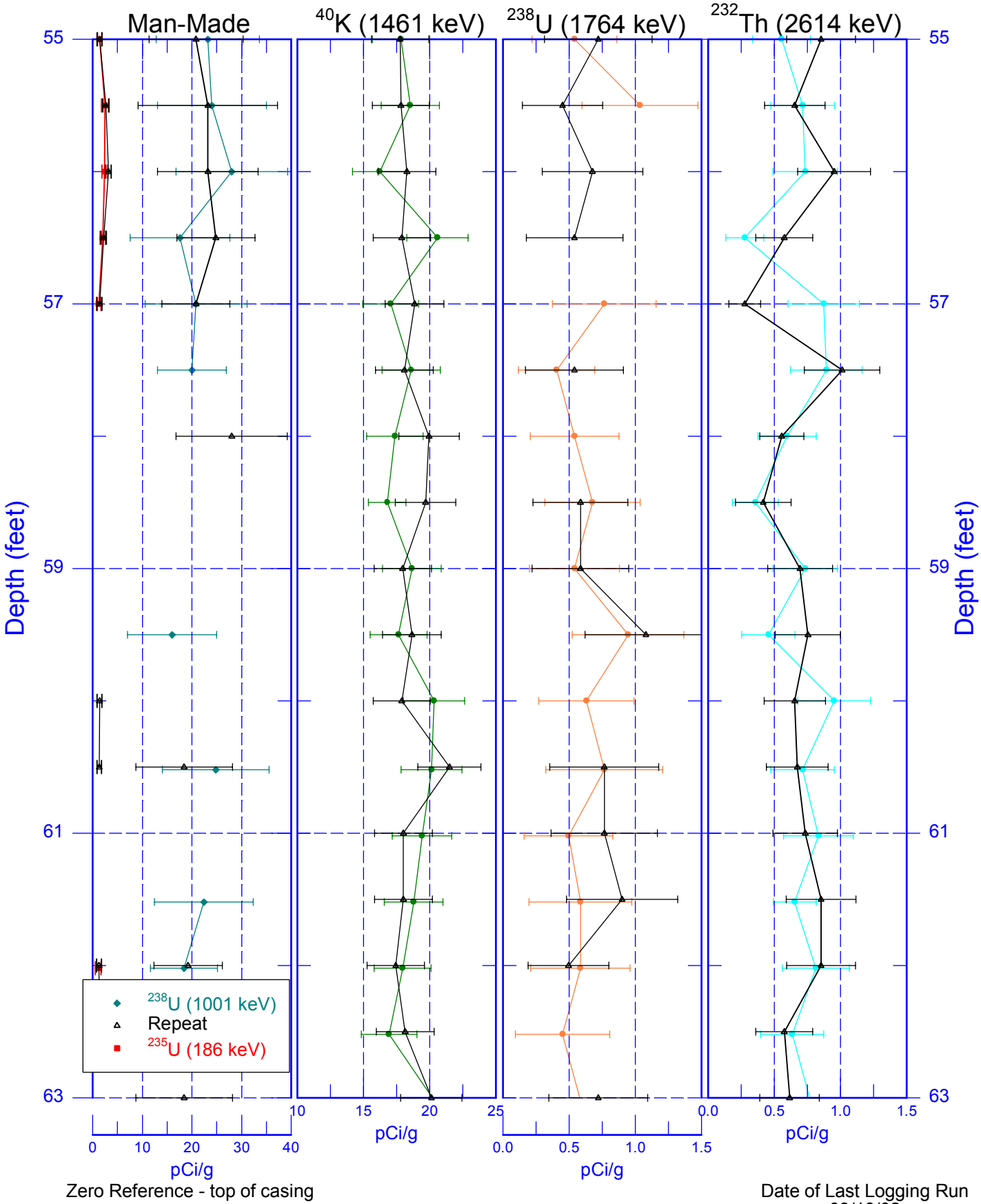
Date of Last Logging Run
03/18/02


299-E28-55 (A6806) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
Dead Time > 40% (SGLS)
137Cs (662 keV)
238U (1001 keV)
235U (186 keV)
SGLS (linear)
SGLS (log)
HRLS (log)
SGLS
HRLS
pCi/g
cps
cps (log)
percent
Zero Reference - top of casing
Date of Last Logging Run 05/03/02

299-E28-55 (A6806) Combination Plot



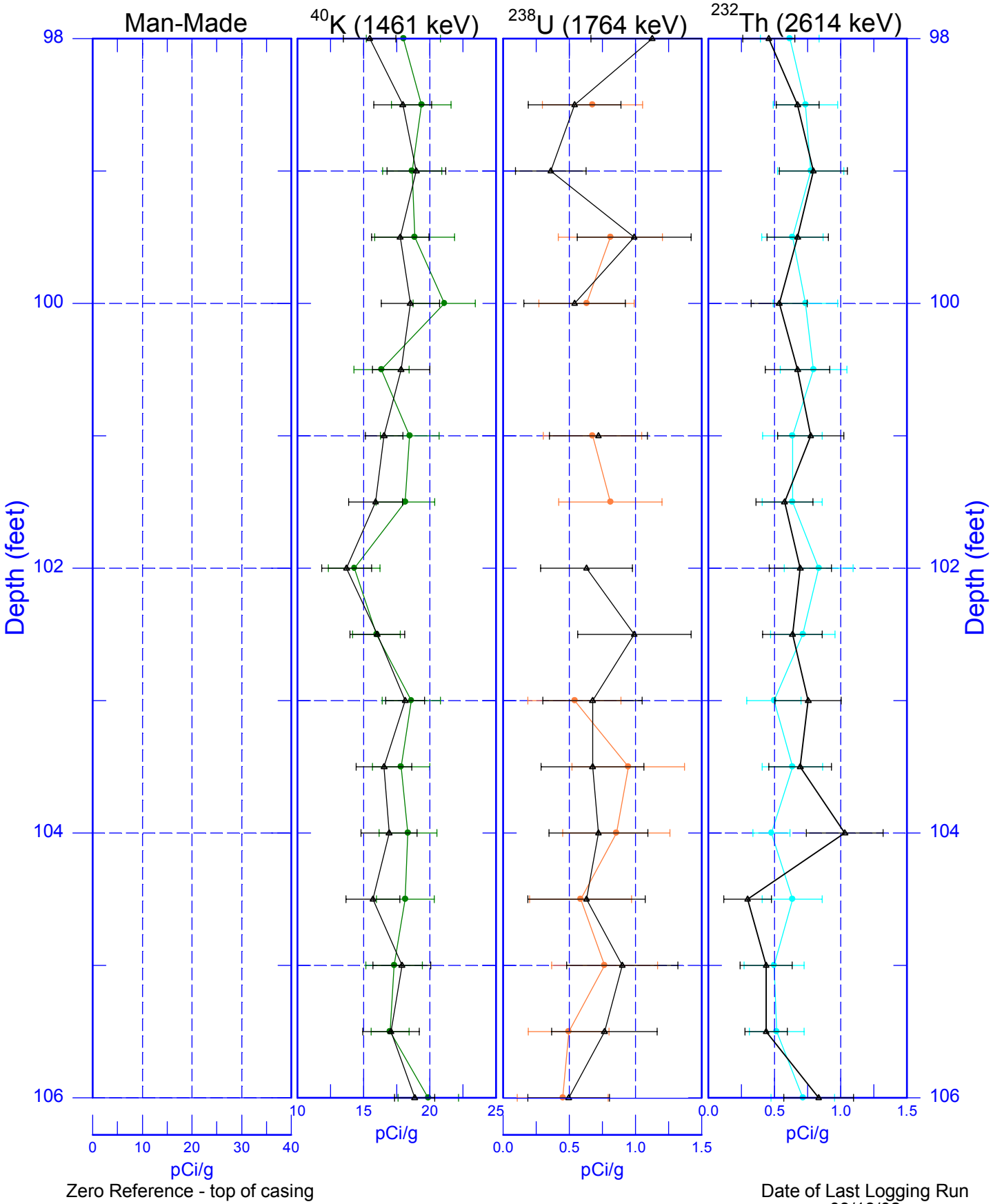
299-E28-55 (A6806)
Repeat Log Section



Zero Reference - top of casing

Date of Last Logging Run
03/18/02

299-E28-55 (A6806)
Repeat Log Section



Zero Reference - top of casing

Date of Last Logging Run
03/18/02